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"You can't always get what you want"

An Optimal Investment Model for Georgia

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Abstract

This is a tool for the Government of Georgia to assist in investment planning at both an aggregate (macro) level and also a detailed regional-urbanity level. We develop an economy-wide computable general equilibrium model of Georgia. Given a certain level of funding, the model searches for the optimal investment strategy that maximizes specific social-economic targets. These include: GDP and welfare growth, income equality, employment creation, export promotion, as well as others. The small open economy is calibrated to a newly developed dataset of Georgia that includes 15 production sectors and 20 regional-urbanity households. A given amount of money is donated from abroad, *i.e.*, it does not create distortionary wealth effects. Funding is placed into a *Development Fund* that channels it towards different production sectors to generate investment and promote growth. This paper summarizes the model, and focuses on the best investments at a macro-level. Officials in the government, however, have been trained to analyze various other scenarios and issues that are not covered in this paper. Overall, the paper finds that it is not possible to maximize all the social-economic targets at once. Different targets require different allocation strategies. Simply put: *You can't always get what you want!*

1 Introduction

After the collapse of the Soviet Union in 1991, the newly independent state underwent serious turmoil, including civil war, deteriorated governance, depreciation of critical infrastructure, and endemic corruption. But after the Rose Revolution in 2003, the country began to implement major political and economic reforms. Foreign capital was injected into the county which helped deliver extremely high GDP growth rates (on average of 6% per year from 2003 to 2013).

Economic growth, however, was not socially inclusive. It mainly centered on Tbilisi (the capital city) while the rest of the country was left behind. High levels of poverty and unemployment persisted, and this led to a build-up of social tensions that ultimately resulted in a dramatic political regime shift in 2012.

The newly elected government promised development projects with a social agenda. As the debate crystalized and focused on welfare issues, funds that arrived from abroad, such as remittances, donations (*e.g.*, Brussels Pledge Commitment) and others, were channeled by the government to achieve specific social-economic goals. These mainly include: promoting aggregate GDP growth, income and welfare equality, employment creation (fighting unemployment), export promotion, and a few others.[1] In addition, the focus also centers on various regional dimension (*e.g.*, administrative regions, East-West), urbanity dimension (*i.e.*, urban versus rural), and household income levels.

Policy makers in Georgia, and across the globe, have always tried to decide on how to optimally allocate limited funds, *i.e.*, finding which sectors or households should receive funds to maximize a social-objective. This, however, is a difficult task because of the lack of information and also because the complex characteristics of the economy. For example in Georgia, around 60% of employment is based on the agricultural sectors. However, GDP growth is fastest among the service sectors that are mainly located in the capital city, Tbilisi.

To consider these issues, we develop an economy-wide general equilibrium model to simulate various alternative investments strategies. The model incorporates a *Development Fund*, which has a certain size of assets, and is tasked with channeling different proportions of the funds to various sectors in the economy. Our aim is to find the optimal allocation strategy that maximizes the social-economic targets (as previously discussed).

The model is calibrated to the Georgian economy using a newly developed social accounting matrix (SAM) of 2013, and searches among more than 42,750 alternative investment

[1] These social-economic goals were developed in collaboration with the Ministry of Economics and Sustainable Development (MoESD) in Georgia during a Fact Finding Mission that was held in 2012.

scenarios. We find that "You can't always get what you want[2]", *i.e.*, not all social-economic objectives can be maximized simultaneously. For example, promoting highest GDP growth would mean that investment should focus on the manufacturing sectors. But promoting highest household welfare in rural households would mean investing in the agricultural sectors. Ultimately, policy makers will choose where to invest. The purpose of this CGE model is to them to make qualified judgments based on a unified modelling framework.

The paper is organized as follows. Section 2 provides background information on Georgia, and reviews the level of foreign capital inflows into Georgia in the past decade. Section 3 reviews literature on rural and urban development, the benefits of infrastructure development, and the benefits and costs of FDI. These are all related to this study. Section 4 describes the theoretical economic model and its assumptions. Section 5 presents the newly developed social accounting matrix, which forms the basis of the model calibration. Section 6 briefly summarizes how the Ministry of Economy and Sustainable Development (MoESD) in Georgia can use this tool for various other issues not covered in this paper. The section also refers to the accompanied instruction manual for this model. Finally, Section 7 summarize the results of the model. Our focus in on results at an aggregate level, but a similar analysis can be done a micro-regional level. Finally, Section 8 provides a brief conclusion.

[2] Referring to the song by the *Rolling Stones*.

2 Background behind the development fund

Georgia is a dual economy with a striking difference between the rural and urban population; it is an agrarian society, but has the potential for rapid growth and modernization. Though the share of the agriculture sector in total GDP is 9.4%[3], it has 52% of the employed population, and provides around 37% of income to rural households (GeoStat, 2014). Agricultural production in Georgia however cannot compete with the rest of the world because productivity lags considerably behind that of other countries, and suffers from structural problems that began after the fall of the Soviet Union, *e.g.*, structural subsistence farming, and the division of land into micro-farming without the formation of resource-pooling that would benefit from economies of scale technology.

The following is an illustration of how low productivity is in Georgian farming. By some estimates, if Georgian farmland were extensively consolidated and labor trained, all of Georgia's agricultural sector would require no more than 45,000 full-time employees, including proprietors. Adding a further 270,000 workers from logistics, contract labor, food-processing and farm-sector service, the total number of workers in this sector would be less than a third of the current working age population in Georgia's rural areas (rather than 53%).

With regards to welfare inequality, variation in consumption is also substantial. For example, urban household expenditure per capita is 2.02 times that of Rural households; consumption expenditures per capita in East Georgia is 1.2 times that of West Georgia; Tbilisi's consumption expenditure per capita is 1.5 times that of the national average (GeoStat, 2013).

Disparities between urban and rural unemployment is also striking. Urban unemployment is very high, on average of 22.1% in 2014 (but could be as high as 40%, depending on the regions, *e.g.*, urban Adjara). Rural unemployment, however, is measured at around 5.4%, which is near the natural rate of unemployment. Overall, the average official unemployment rate is around 15% in 2014. It is, however, debated whether self-employment (as opposed to hired employment) should really be considered employed. Nearly most of these workers are subsistence farmers in rural area, which lowers the official unemployment levels in rural areas. Furthermore, a good number of surveys have now established that the actual unemployment rate might be higher than 30%.[4]

Once the wealthiest Soviet republic, Georgia fell far behind others (except, perhaps, Tajikistan, Kyrgyzstan and Moldova) on almost any parameter of wellbeing. Adjusted for purchasing

[3] National Statistics Office of Georgia (GeoStat), 2013 data

[4] See "Correcting Unemployment Numbers – A Call for Government Action" by Hans Gutbrod at ISET Economist Blog http://www.iset.ge/blog/?p=1897.

power parity, Georgia's annual income per capita in 2011 was around USD 5,400 to 5,800 (similar to the resource-poor Armenia).

Moreover, the "median" Georgian, as opposed to the "average" Georgian, is much poorer than suggested by the per capita income estimate. Like any average measure, the income per capita figure masks inequality in the distribution of income. Georgia is much less equal compared to all ex-Soviet peers (with the possible exception of Russia). While GDP growth is important, equity issues are also vital. Currently, the Gini coefficient in Georgia is estimated at above 40, higher than the other countries in the region (*e.g.,* the Gini coefficient in Armenia and Azerbaijan is 31 and 34, respectively[5]).

Empirical studies have shown that countries with higher income inequality tend to have lower economic development. One reason is that inequality creates social turmoil and discontent, which leads to socio-political instability. The rise in the political and economic uncertainty will then impede on private investments, from both domestic and foreign firm. This kind of transmission mechanism seems to be also an important factor in the Georgian context. For example, a Growth Diagnostics study by Babych and Fuenfzig (2012) finds that political instability and country risk factors in Georgia are among the potential binding constraints to long-run economic growth. Thus, addressing these issues should be a primary objective of Georgian policymakers.

2.1 Untapped potential in Georgia

The country has a vast untapped potential, and policy makers are keen to find ways in which new investments can be used to tap into it and promote welfare. According to the National Competitiveness Report for Georgia 2012/2013, investment in infrastructure is considered to have a large spill-over effect on almost all sectors (Livny et al., 2013). It is a cross-cutting sector that is used as an intermediate input in many other sectors. Georgia is furthermore positioned in a geographic transit corridor between Europe and Asia, and benefits from being a strategic hub for trade and transport.

Georgia is a highly open economy, with a rapidly growing manufacturing and services sectors in urban areas. Urban workers are highly skilled, and speak many languages. Its banking sector is highly competitive and modern, and has the potential of becoming a hub for the Caucasus countries, similar to the role that London plays in Europe. (See a related discussion by Yerushalmi and Gorgodze (2015) on harnessing the banking sector to promote economic growth in Georgia.)

Today, development policies and strategies in Georgia are geared towards poverty eradication. While the incidence of poverty has declined to some extent, it is still substantially higher in rural rather than urban areas. The current goal of the Government of Georgia is thus to help create employment and raise incomes and eliminate poverty. Faced with limited resources, the government requires information on which sectors to support, in order to achieve various desired social objectives. Supporting the agricultural sectors is an obvious candidate because it provides income to the majority of Georgian households. However, supporting other sectors

[5] The World Bank data: http://data.worldbank.org/indicator/SI.POV.GINI

is equally vital for long-term growth and stability. One question therefore is: "who to support and by how much?"

Rural areas are remote by definition. They frequently have bad road connections, partly a result of the Georgian topography, and partly because of a long period of deprecation without new investment. This especially affects rural households that cannot reach commodity markets to sell their produce. For example, the Integrated Household Survey (IHS) data reports that income from selling agricultural produce is very low across Georgia. The monthly average is 131 GEL, in rural areas, and varies from only GEL 30 per household to GEL 328, depending on the region (GeoStat 2014).

Thus, one obvious approach to raise welfare is by investing in internal road construction that will connect villages to urban centers. The Samtskhe-Javakheti road rehabilitation project is a successful example. At 209 million USD, over a period of about two years, this was the largest investment of the Millennium Challenge Corporation (MCC) implemented in Georgia after the August 2008 war with Russia. In the same period (2009-2011), the average household income in this region increased more rapidly than anywhere else in Georgia, whereby they were fifth initially, and in top place within two years.[6] The investment helped the region to switch from subsistence farming to market oriented farming. Better road decreased transportation costs that connected households to markets, and raised incentives to produce goods for selling rather than own consumption.

Besides deciding where to invest specifically (e.g., transportation or agriculture), another question is "where the development aid comes from?" In this model, we assume that the government sets-up and manages a *Development Fund,* whereby capital is obtained from foreign sources, *e.g.*, from foreign donations. Alternatively, in the model, it is a simple matter to obtain funds through taxes, but we choose the former to minimize issues arising from distortionary taxation. Furthermore, changing tax policy in real-life (as opposed to the model) is *not* a simple matter because of the legislation requirements and various political considerations. In future work, the model could be changed accordingly to assess this, if desired by the government.

In what follows, we will assume that capital for this fund is provided by foreign donations, not through taxation, and that the fund's size is GEL 1 bln (i.e., around 3.7% of GDP). This simple, rounded, number has been used in previous debates in Georgia (*e.g.*, the GEL 1 bln Agricultural Fund). Furthermore, as we discuss in the next section, this is a realistic sum, given past foreign donations and remittances. (Alternatively, it is a simple matter to evaluate different fund sizes. Official within the MoESD have been trained to operate different model scenarios which are not evaluated in this report.)

[6] The average income in Samtskhe-Javakheti rose from GEL 516 in 2009, to GEL 857 per month in 2011 (IHS, GeoStat).

2.2 Possible avenues for obtaining development funds

New investments, which would generate growth, require capital. But in the current environment of high interest rates (at around 22% on loans to individuals, and spread of around 10%[7]) entrepreneurs find it difficult because borrowing is extremely expensive.

In a related research, Yerushalmi and Gorgodze (2015) discuss this problem in Georgia, and argue that this is caused because capital supply is relativity fixed. Most of the large firms, which were inherited from the Soviet era, are already fully collateralized, which makes it difficult to raise new capital.

There are various methods to raise the supply of capital, and thus lower its cost. Some possibilities are: to raise household savings rate, which are currently very low in Georgia. Others propose to enable banks to lend more by lowering collateral requirements, or improve the efficiency of the equity markets by improving regulation, transparency and property rights. In addition, attracting foreign capital (FDI), or raising donations and remittances from abroad, is another way of raising the supply capital.

Currently, a popular sentiment in Georgia is to expand the banking sector (as previously mentioned). The argument is that compared to western economies, this sector is fast growing, healthy, and well developed. It could become a banking hub in the Caucasus region (similar to London in Europe), and it has been effective in channeling capital towards new investments in the recent past. However, as discussed by Yerushalmi and Gorgodze (2015), enlarging it through a relaxation of lending requirements will also raise its riskiness. Using a (related) financial general equilibrium model, calibrated to Georgia, they show that it is preferable to improve the equity market (e.g., by clarifying and improving regulation and removing barriers such as asymmetric information) rather than raising the riskiness of the banking sector.

Foreign capital inflows

The other attractive method for raising capital is through foreign inflows, which the Government of Georgia has been quite successful in doing in the past decade. The three main sources are: (1) FDI Inflows, which amounted to around 10% of GDP, on average, per year[8] (2) Net Remittances, on average of 6.9% of GDP, per year (GeoStat and NBG), and (3) Donor Inflows, on average of 5.1% of GDP, per year (GeoStat and NBG).

Below, we briefly provide two example of foreign capital inflows: (1) a donation, and (2) FDI. In both cases, the investments were channeled towards specific targets, in a similar way to how our model searches for the optimal investment strategy.

First, in 2008, an international donors' conference of more than 35 countries and international donor organization pledged USD 4.5 bln to be allocated by 2015. This was named the *Brussels Pledge Commitment*. The purpose was to boost the economy in the short-run and support the transition towards long-run growth and competitiveness. On an average of seven years, this was around USD 0.64 bln per year (*i.e.*, 4.6% of GDP on average).

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[7] Source: National Bank of Georgia, NBG.

[8] Source: Ministry of Economics and Sustainable Development (MoESD) and Geostat: http://www.economy.ge/uploads/ek_mimokhilva/fdi_investiciebi/FDI__2015.05_eng.pdf

Table 1 (below) summarizes the allocation strategy of this fund, which was designed by Government of Georgia, in coordination with the donors. The committed funds were channeled towards the following specific sectors and households:

Table 1: The planned allocation of the Brussels Pledge Commitment

Allocation targeted to:	**% of total**
Internally displaced persons (IDPs)	6%
Agriculture and others	10%
Energy Infrastructure	12%
Urban and Municipal Infrastructure	15%
Transport Infrastructure	17%
Private sector	19%
Direct Budget Support	21%
Total	**100%**

Source: Ministry of Finance, Georgia

Second, a Georgian Co-investment Fund (GCF) [9] was established in September 2013 as a private equity fund. Its objective is to inject capital into the Georgian economy via long-term development projects and attract further international sources. Its minimum IRR[10] threshold for investment in a project is 17%, and it is committed to invest at least 80% of its equity domestically. The GCF committed a total of USD 6.5 bln, starting from 2014 to 2024. On average per year, this is USD 0.65 bln (around 3.9% of 2014 GDP). The GCF furthermore projects an additional USD 10 bln to be added to the portfolio from outside potential partners. Table 2 summarizes the GCF's planned allocation by sector:

Table 2: The GCF planned allocation

Sector	**GEL bn**	**Weight**
Agriculture and Logistics (i.e., Transport)	0.5	8%
Other	0.5	8%
Hospitality and Real Estate	1	15%
Manufacturing	1.5	23%
Energy	3	46%
Total	6.5	100%

[9] **Source:** www.gcfund.ge/en/

[10] IRR – Internal Rate of Return, a measures of the profitability of an investment.

The GCF expects that this will boost the economy through FDI and by attracting large international enterprises. It will support healthy businesses and promote the local equity market, which currently is underdeveloped. New jobs will be created that require new and improved skills, and raise labor productivity. Finally, the interaction with foreign investors will encourage the adoption of new technologies and knowledge.

These two previous examples demonstrate that a realistic fund-size is around 3.5% to 4.5% of GDP. Our model is calibrated to data for 2013, whereby we simulate a fund of GEL 1 bln (around 3.7% of GDP 2013), and our aim is to find the best allocation strategy. For example, we will test the BPC and the GCF funds, and report results. We will then search whether other allocation combinations might be better at maximizing the social-economic goal. Prior to this, however, the next section provides a brief review of related literature.

3 Literature Review

The following section provides a brief literature review of related studies. The focus is on the following issues: it compares the welfare of rural versus urban household, and evaluates various policies that promote the agricultural sectors versus non-agriculture sectors. It also reviews studies that highlight the importance of infrastructure development that are cross-cutting sectors that promote economic growth. Finally, research also focuses on benefits and costs that FDI has on economic growth and income equality.

In all the above, the common thread is the search for welfare improving policies. The purpose of our paper is mainly the same, but the difference is in our approach. We *systematically* use the model to search for a policy that maximizes a specific social-goal. Rather than testing alternative policies, we focus on one policy that has many sets of options. We do this by having a *development fund* that searches for an optimal subsidy strategy that will maximize a specific goal. Below we briefly review some of the previous related literature.

Supporting urban versus rural related activities?

Azis (1997) developed a CGE model for Indonesia to assess a series of policy changes that occurred around 1985. It focuses on the rise in the government's tax base alongside a reduction of key taxes (such as consumption tax) and the "freeze" on real government investments. Both, static and dynamic simulations showed that these policies in Indonesia positively affected the country's macroeconomic indicators (*e.g.*, GDP and export), but slightly worsened rural household income in favor of the urban household income.

Benin et al. (2008) develop a CGE model for Uganda that analyzes the linkage and trade-offs between economic growth and poverty reduction at both the macro- and micro-economic levels. The study assesses the resources required by the agricultural sector to achieve the development goals committed by the government. The paper concludes that achieving its targets, together with sustainable economic growth, would require additional investments (about a fifth of the total government budget) as well as improvements in the efficiency of public spending. This would substantially reduce the number of poor people living below the poverty line, and significantly improve the well-being of both rural and urban households.

In two similar papers, Dorosh and Thurlow (2014, 2012) develop a recursive CGE model for Uganda and Ethiopia. In both papers, they find that increasing public investment in urban areas leads to higher growth rates, in the long-term. But in the short-term, however, it does little to improve national poverty because labor migrates from rural areas towards urban areas. Agricultural production falls, as a result, which raises its real price. They find, therefore, that supporting rural areas and improving agricultural productivity is a more effective policy

for raising welfare. The growth of the economy indeed slows down, but welfare to poor rural and urban households improves more significantly.

Infrastructure development

A vast literature has stressed the positive relationship between investments in public infrastructure, the productivity of the private sector, and how this stimulates economic growth (Aschauer, 1989; Barro, 1991; Munnell, 1990).

Many researchers have argued that major investments that scale up infrastructure, would transform them from being a constraint, to an engine of growth, and that this would indirectly contribute to poverty reduction in the long term. A report by Foster and Briceño-Garmendia (2010) finds that half of Africa's growth was generated by infrastructure. They argue that improved infrastructure will accelerate urbanization, which has been the engine for growth in many countries, and will also improve regional integration.

Estache et al. (2012) examine the effects of infrastructure investment in six African nations. Simulations were conducted on four sets of investments: Non-productive investment, road investment, electricity and telecom investment. They compare various infrastructure investments, which are funded by different fiscal tools. They find that foreign aid could produce the Dutch Disease effect[11], but that the negative impacts are strongly related to the type of investments performed. Also, the structure of the economy where these policies were applied matters a great deal, *i.e.*, different economic structures produced diversified results for the same type of investment. Finally, an important element is the capital-labor ratio in the various sectors. It plays an important role in determining the winners and losers in the economy because of its effect on factor payments (*i.e.*, which household receives them).

Another important and controversial question is whether public infrastructure spending will decrease private investment (the crowding-out effect) or will it have a multiplier effect. The choice of funding scheme is also a key issue in scaling up infrastructure. Using an inefficient funding scheme could attenuate the positive returns of public infrastructure. It is therefore important to select the most appropriate method of funding infrastructure construction.

FDI effect on income and income inequality

In the absence of domestic investment, foreign capital inflow becomes crucially important for a country, particularly for developing transition economies. The effect that FDI has on income inequality is however not straightforward. For example, the OECD (2002) highlight some of the positive effects from FDI. Some examples are the adoption of new technologies, motivating international trade integration, developing domestic enterprises and human capital, and improving welfare overall. However, FDI also contains dangers such as balance of payment deterioration, and weak positive linkage with local communities which creates social disruption. FDI furthermore has the potential for harmful environmental impacts, especially those related to resource extraction. Finally, in many cases, FDI can raise income inequality.

Traditional trade theory suggests that FDI draws on unskilled labor in developing countries. But the true impact on growth and income inequality is inconclusive. One the one hand, multinational corporations are blamed for paying low salaries to workers in the developing

[11] The inflow of foreign capital appreciates the domestic currency, making other domestic production less competitive.

and transition countries that prolong and lead to poverty traps. Others, however, argue that it improves wages because it raises demand for labor (Graham, 2000).

Nunnenkamp (2004) also highlights the questionable benefits, for two reasons: First, studies have shown that countries must reach a certain level of economic and institutional development before they benefit from FDI. Second, the effect that FDI has on poverty reduction is unclear because the skilled workforce (in the formal sector) tends to benefit more, than the unskilled, which furthermore raises inequality (Clark et al., 2011; Feenstra and Hanson, 1997; Matsuoka, 2001; Overseas Development Institute, 2002; Te-Velde and Morrissey, 2004). Feenstra and Hanson (1997) find that regions where foreign firms dominated, FDI accounted for a 50% growth in salaries for skilled workers in the late 1980s.

Lotze (1998) showed that even if FDI goes into the proper sector, resources might be driven out of the primary sectors into more advanced sectors when a transfer of technology is not accompanied by an equal capital flow.

Using a CGE model of the Bolivian economy, Nunnenkamp et al. (2007) provide a medium and long-run estimate of the FDI effect on poverty and income inequality. The simulation incorporate informal activities, and find that FDI improve investment in Bolivia, promoted economic growth, and reduced poverty, but income inequality (particularly between rural and urban households) increases.

4 Model Description and Assumptions

To analyze the optimal investments in Georgia, we develop a general equilibrium model in the spirit of Dervis et al., (1982) whereby three weak inequality conditions must hold simultaneously: zero profit, market clearance and income balance.

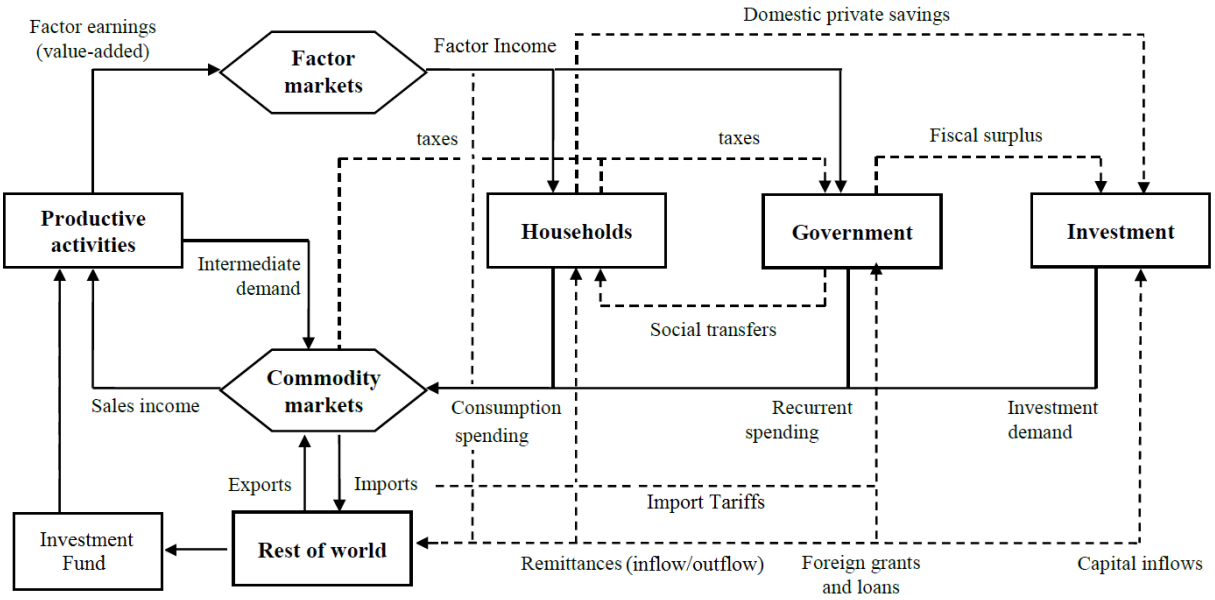
We use a static model that compares one long-run steady state with another, and does not focus on the dynamic transition towards the steady state. The long-run is generally expected to be reached within seven to ten years after the change begins, but should *not* be considered a precise length of time. Rather, it is the length of time that it would take capital and labor to migrate from one sector to another.

In comparison, a short-run view assumes that some inputs are *not* mobile across all sectors. Capital could be fixed by investment projects in the short-run and would not reallocate to more competitive sectors, *e.g.*, it is *not* possible to immediately convert idle farmland into manufacturing facilities, because it practically takes time to build a new facility, or possibly legal restrictions and 'red tape' impede this. Similarly, labor mobility becomes an issue if workers cannot access new sectors because they require a long time to acquire new skills, or other types of labor movement barriers. In the long-run, however, capital and labor have sufficiently enough time to adjust to the investment changes that are introduced.

4.1 Agents in the model

The economy is depicted in Figure 1 with arrows showing the flow of money. There are three main agents in the model: households, government, and rest of the world (ROW).

Figure 1: Model of the economy



Note: The figure shows the linkages between various agents (households, government, rest of world), various markets for goods and inputs, and flow of money.

The model includes 20 different households, each from one of ten administrative regions and an urbanity (urban or rural). Each household is endowed with capital and labor, which they rent in the factor markets. They also receive transfers from other agents, such as other households, the government, or the rest of the world (ROW). Their income is then used for consuming goods, which they buy from the commodity markets, or they can save.

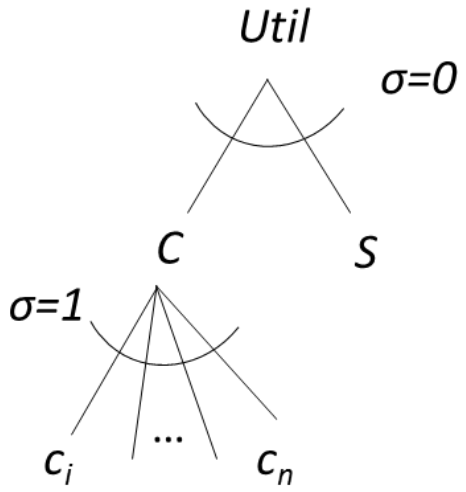
The representative household is assumed to be rational, with a locally non-satiated preference relation,[12] and a continuous, two-level utility function. In the first-level, households maximize a utility function that is a function of the consumption bundle and private savings, in fixed shares (*i.e.*, a Slow-type model assumption). In the second-level, the household maximizes a Cobb-Douglas utility function of various goods. (An illustration of the household utility function is given in Figure 2).

The government's budget is based on commodity tax collection (*i.e.*, VAT and Excise tax), income tax from households, and import taxes (see Figure 1). The government is also an owner of some of the capital in the economy, and therefore receives capital income, *e.g.*, from property ownership, dividends received from government owned companies, etc.

On the expenditure side, government buys commodities from the product market, which it uses to provide government services, and also transfers fund directly to various households or subsidizes firms.

[12] For any bundle of goods there is always another bundle of goods arbitrarily close that is preferred.

Figure 2: Two-level household utility function



Note: The Household has a multi-level utility function. At the top level, the household consumes a bundle of goods and saves, in fixed proportion. In the lower level, the household consumes various commodities using a Cobb-Douglas function. σ represents the substitution elasticity.

The model is a small open economy (SOE), and the country therefore has no effect on world prices. The economy exports and imports to/from the rest of the world (ROW), whereby the prices of exports and imports prices are quoted in foreign currency, and are exogenous. Both the households and government receive remittances or send money abroad. Finally, the ROW also receives income from dividends and profits of foreign owned firms within the domestic economy (*i.e.*, an outflow of capital value added from FDI).

Finally, all agents save, in the form of private, government, and foreign savings. This forms the supply of capital from which commodities are demanded for investments. As previously mentioned, we assume a Solow-type model whereby savings is kept in fixed-proportion with consumption.

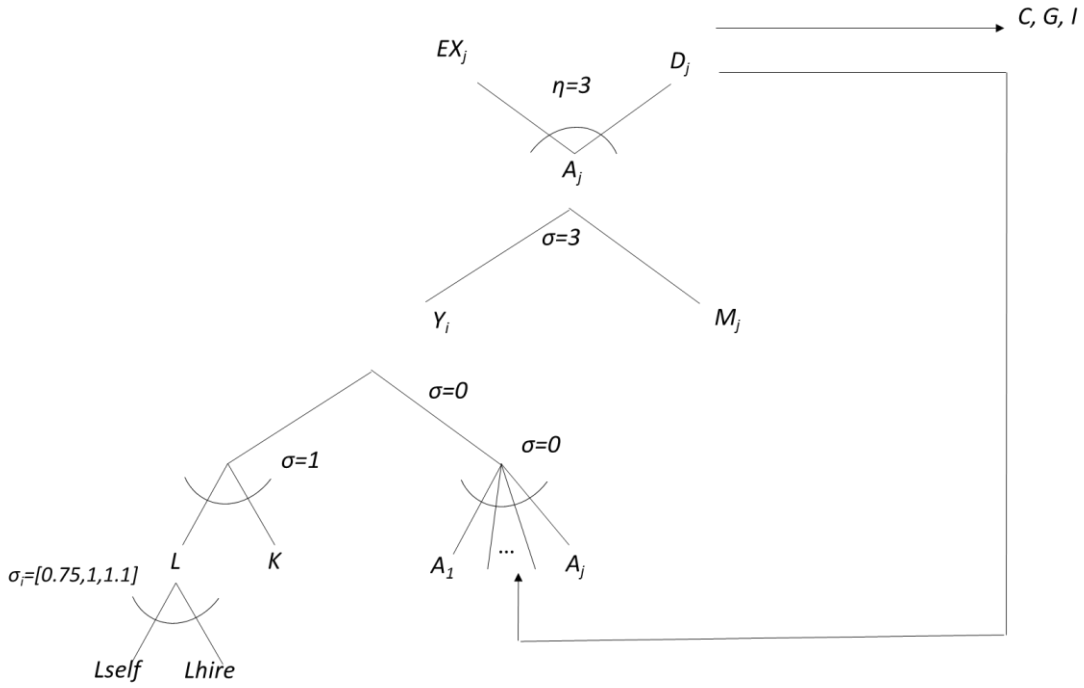
4.2 Firms

The model incorporates 15 different sectors, each producing one activity. Firms produce goods using a multi-level, differentiable, constant return to scale production function that combines input factor (labor and capital) with intermediate goods. Two types of labor are available (Self-employed and hired) that together form an aggregate value added for labor.

We allow for sectors such as agriculture and fishing to have a higher substitution elasticity between hired and self-employed, and a lower substitution elasticity for other sectors. The argument behind this assumption is that while the vast majority of self-employed population are involved in agriculture, they can be hired as well by agribusiness. However, it is relatively more difficult for the self-employed worker to move into other sectors such as banking, or IT, because this would require additional skills and training.

The aggregate labor is then combined with capital using the traditional Cobb-Douglas function, which is then finally combined with intermediate inputs in fixed proportions. See Figure 3.

Figure 3: Production Sructure



We also use the Armington assumption of composite goods to account for the possibility of cross hauling (two-way trading) in the same good, *i.e.*, goods are both imported and exported. Domestic production of activities are transformed into commodities and combined with imports. This forms the domestic supply of commodities. Some of these are then exported, or domestically consumed by households, government, investment, or as intermediate inputs for domestic production (Armington, 1969). (See illustration in Figure 3.)

Figure 3 illustrates the production structure used in this model as previously described, with labor and capital L and K (respectively), Armington final commodity A_j of commodity *j*, activity production Y_i, export and imports EX_j and M_j (respectively), and domestic use of commodity D_j.

4.3 Modeling Unemployment

As previously discussed, unemployment is extremely high in Georgia; the country's average is at around 15% (in the years 2011 to 2015). In 2013 (the year the model is calibrated to) urban unemployment was 26.2% and rural unemployment at around 6.9%. Table 3 summarizes the baseline unemployment levels by urbanity, as reported by the National Statistics Office of Georgia (GeoStat) in 2013. The difference between active and unemployed persons is the number of employed persons, which are classified by self-employed and hired labor (not provided in this table).

Table 3: Baseline unemployment by region and urbanity (persons, %, 2013)

Region	URBAN AREA			RURAL AREA		
	Active	Unemployed	Unemployment Level	Active	Unemployed	Unemployment Level
	(persons)			(persons)		
Kakheti	30,840	5,587	18.1%	165,604	7,022	4.2%
Tbilisi	420,436	123,172	29.3%	24,219	6,511	26.9%
Shida Kartli	40,370	9,781	24.2%	112,428	5,486	4.9%
Kvemo Kartl	53,629	6,536	12.2%	140,998	9,192	6.5%
Samtskhe-Javakheti	18,792	3,466	18.4%	78,353	1,907	2.4%
Adjara	61,062	22,410	36.7%	129,639	12,170	9.4%
Guria	11,967	481	4.0%	69,275	3,345	4.8%
Samegrelo and Zemo Svaneti	64,508	21,006	32.6%	151,529	16,383	10.8%
Imereti	138,517	28,643	20.7%	249,204	12,750	5.1%
Mtskheta-Mtianeti	8,348	1,332	16.0%	34,165	4,649	13.6%
Total	**848,469**	**222,415**	**26.2%**	**1,155,413**	**79,416**	**6.9%**
Total Overall	***2,003,882***	***301,831***	***15.1%***			

Source: GeoStat (2013). The table shows the level of unemployment by region and urbanity. The CGE model is calibrated to these values.

In the model, as long as unemployment is much higher than the natural unemployment levels, workers are elastically supplied. This means that wages rise slowly, and capital becomes more scarce and valuable. Various investment policies, which would normally raise demand for labor, and therefore wages, will not show-up as an immediate rise in wages as long as unemployment is high; competition in the labor market dampens wage increase because workers accept lower wages to secure a job.

To incorporate this issue, we calibrate the labor supply to account for the unemployed workers, and introduce a minimum wage constraint that follows a consumer price index (CPI). Note furthermore that to consider cases of low income regions that have a high population number, the aggregate CPI is computed as the CPI of the 20 households weighted by their per capita consumption.

Finally, we assume that the long-run natural unemployment level is 5% (*i.e.*, labor is fully employed beyond this point). Thus, as long as the unemployment levels are well above 5%, when demand for labor rises, increasing wage pressures attract workers to enter the labor market and reduce the unemployment levels. However, as long as workers are sufficiently abundant, they are willing to accept the minimum wage that rises according to the aggregate CPI. When unemployment reaches 5% (*i.e.*, the floor level), wages can rise above the minimum CPI because workers are now fully employed.

4.4 The Development Fund

A *Development Fund* is introduced that channels investment capital to various sectors. This is illustrated by the box in the lower-left corner of Figure 1. We assume, furthermore, that the Fund invests in the form of an output subsidy. Alternatively, we could have used various input subsidies (either on capital, labor, or both), but decided to simplify the amount of possible policies.

It is possible that the government could improve on their targeted social-policy by directly providing subsidies to labor inputs, for example, thus focusing on unemployment or income inequality goals. This could be explored in further research, but was not done in this study. Here, we search for the best allocation strategy given a policy, rather than looking for an optimal policy given a pre-set allocation strategy.

Furthermore, having a labor input subsidy would only add to the debate about progressive tax policy and supporting various households. Though we are interested in this, we rather avoid the debate directly and leave it for policy makers. Further work could be done to investigate labor subsidy upon request by the government.

Note finally that our assumption is that the fund's assets are "donated" from outside the economy, *e.g.,* from donor countries or individuals. In other words, they are not taken from the budget of the government or household incomes. We assume this partly for simplicity, but mainly because this does not distort household income in cases where the fund would be collected by taxes. It is a simple matter to change the assumptions behind the source of the Fund's assets. This could be updated according to the requirements of the simulation, and we leave this for further possible research avenues.

5 A Social Accounting Matrix for Georgia

The model is calibrated to a newly constructed 2013 social accounting matrix (SAM), which is mainly based on national accounts (input output tables) and Integrated Household Survey (IHS) data, both provided by National Statistics Office of Georgia (GeoStat). It also uses the country budget information for 2013 provided by Ministry of Finance, and additional data from the National Bank of Georgia, such as remittances. (See Labadze et al., (2015) for a more detailed description of how the Geogia SAM 2013 was constructed.)

The newly developed SAM provides information on the demand and production of 67 detailed activities, and 45 commodities, and 20 regional households. For the purpose of this paper, the detailed sub-sectors are aggregated into 15 main activities and commodities. We do this to simplify our analysis, and especially because it limits the number of required simulations that channel capital from the Fund to the sectors. It is a simple matter, later on, to test the model with a more disaggregated number of sectors. On the other hand, we maintained the high regional household disaggregation because this is important to assess the effect that various investments will have on the households.

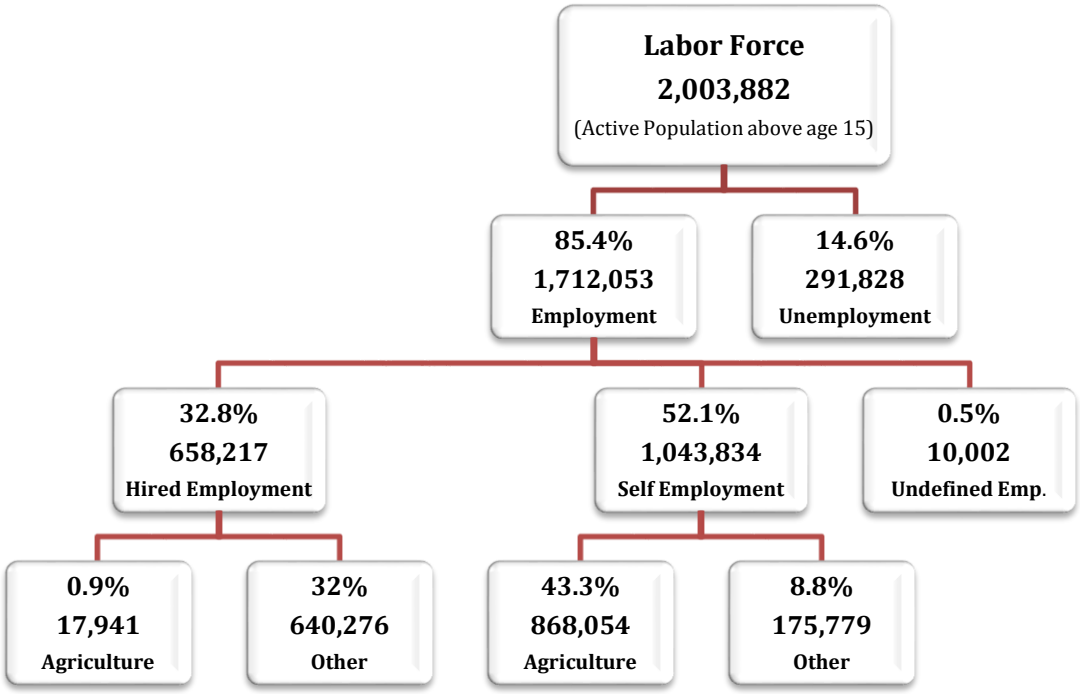
Below we provide more information about how the SAM was developed.

5.1 Labor

As previously discussed, labor is classified by hired workers, or self-employed workers that are mainly based in the agricultural sectors. GeoStat only defines value added as a unique number and does not distinguish labor and capital inputs separately. As a proxy for labor value added, we use the Integrated Household Survey (IHS) data to calculate the average salaries within the sectors for hired and self-employed labor. These are then multiplied by the number of employed workers in each sectors. In such a way, we proxy the labor value added by the wage bill, and retrieve capital value added as a residual.

Agriculture, fishing, and fish farming are special cases. In Agriculture, for example, 98% of the workers were self-employed in 2013 (see the breakdown as illustrated in Figure 4). The IHS reported however that the average salary was GEL 495. This is misleading because only 2% are hired laborers, while the rest were more likely to receive wages from subsistence farming, which is around GEL 150. To correct for this, we use the weighted average of the worker types with the official hired average salary and subsistence values.

Figure 4: A breakdown of Georgia's labor force 2013 (% of total, persons)



Source: Integrated Household Survey Data (Geostate, 2013). The figure shows that from a total of 885,995 workers in the agriculture sector, only 17,941 are hired, which amounts to only 2% of the employed workers.

Table 4 summarizes the total value added, as provided by GeoStat, and the breakdown between capital, labor, of which labor is divided by self-employed and hired labor. Agriculture and Fishing are clearly labor intensive, and more so, because of the high ratio of self-employed that are dominated by subsistence farming. Later, Table 4 will become important in explaining the main drivers of the results in Section 7.

Table 4: Value added by economic activity (GEL 2013 mln, %)

Sector	ID	Total Value Added (GEL mln)	of which		of which	
			Capital	Labor	*Self-employed*	*Hired*
		(1)	(2)	(3)	(4)	(5)
Agriculture	1	2,113	25%	75%	93%	7%
Fishing	2	18	38%	62%	80%	20%
Mining	3	169	42%	58%	2%	98%
Manufacturing	4	3,136	77%	23%	30%	70%
Electricity, gas, water	5	716	56%	44%	2%	98%
Construction	6	1,467	64%	36%	29%	71%
Wholesale and retail trade	7	4,177	67%	33%	50%	50%
Hotels and restaurants	8	475	72%	28%	10%	90%
Transport and communication	9	2,511	60%	40%	43%	57%
Financial intermediation	10	705	29%	71%	3%	97%
Real estate	11	1,852	84%	16%	16%	84%
Public administration	12	2,365	52%	48%	0%	100%
Education	13	1,195	43%	57%	6%	94%
Health and social work	14	1,343	71%	29%	6%	94%
Other	15	1,093	67%	33%	15%	85%

Source: GeoStat (2013). The table shows the capital and labor ratios for the fifteen production sectors. The CGE model is calibrated to these value.

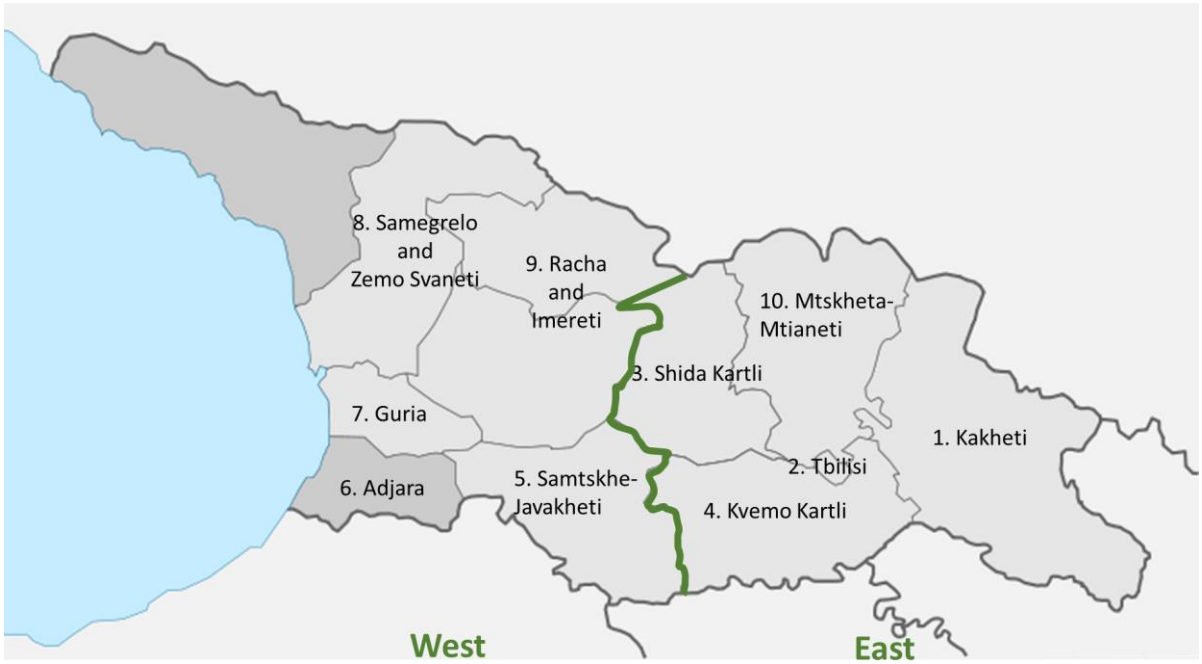
5.2 Household expenditure on consumption

Households are defined according to ten administrative regions[13] (illustrated in Figure 5), and also by their urbanity (*i.e.*, urban or rural). Overall, therefore, our model is calibrated to 20 different specific households. Note furthermore that Figure 5 illustrates our definition of East and West of Georgia.

To estimate each household consumption expenditure, we use the IHS data to control for the ten regions and their urbanity. Agriculture is a crucial sector that requires additional care because, as previously mentioned, it covers many subsistence farmers and the data is not fully reliable. We therefore cross-check with other data sources. For example, from the IHS, we use the *ConsPurch_03* table to estimate the expenditure on agricultural products using the COICOP international standards (5 digit codes). To verify that the proportion of expenditures are correct, we also estimate the expenditures on food and non-alcoholic beverages (as well as education, health and other sectors) from the *tblExpenditures* table. This approach was similarly used for other goods and services consumption expenditure.

[13] Kakheti, Tbilisi, Shida Kartli, Kvemo Kartli, Samtskhe Javakheti, Adjara, Guria, Samegrelo Zemo Svaneti, Imereti Kvemo Svaneti Racha Lechkhumi, Mtskheta Mtianeti.

Figure 5: Georgia's ten administrative regions



5.3 Household's Incomes and expenditures

A portion of household income consists of inter household transfers (GEL 1,260 mln), social transfer payments from the government (GEL 2,244 mln), and remittances. A matrix of transfers/receipts is based on the IHS Data as follows:[14]

Transfers from households to other households was estimated using income from relatives (*i.e.*, the variable "axloblebisagan") in two stages: first, for each group of households, we sum the total amount received from other households. Second, the share of population was used to redistribute these amounts across the household expenditure accounts.

As for the remittances, the National Bank of Georgia reports that remittances inflow in 2013 was USD 1,477 mln and outflow was USD 155 mln. We use the average exchange rate of 1.6659 GEL/USD over the period of 2013, to obtain remittances received of GEL 2,461 mln and remittances outflows of GEL 259 mln.

To estimate the remittances across household regions and urbanity, we used the income in foreign currency (variable "ucxoetidan") from the *tblincomes* table of the IHS data. Money sent abroad was disaggregated proportionally by the size of the population in rural and urban areas from the ten administrative regions.

[14] Geostat: http://geostat.ge/index.php?action=meurneoba&mpid=1&lang=eng

5.4 Some additional description of the SAM

Current account deficit was USD 926 mln, which amounts to around GEL 1,543 mln (using average annual exchange rate in 2013[15]). Household savings-investment, for which official data does not exist, is straightforward to obtain. GeoStat provides data on net operating balance and current account deficit. In addition, the value of the gross capital formation of GEL 6,653 million is also known. The residual, therefore, is the household saving-investment which is GEL 4,398 mln.

The rest of the world also receives income from foreign direct investment (FDI) value added amounting to GEL 507 mln. This includes dividends received by foreigners and part of profit which is not reinvested. This value is a residual number (*i.e.*, an estimate), while all other values are official data from different sources.

Taxes are defined by value added tax, import tariffs, excise tax, subsidies and other taxes. The distribution of these taxes among sectors was provided by GeoStat, upon request. Overall in 2013, receipts from VAT were GEL 2,847.8 mln, excise tax were GEL 722.3 mln, import tariffs were GEL 89.4 mln. Total subsidies were GEL 147 mln whereby their distribution among sectors was provided by the supply table. The rest of the taxes paid by households (GEL 3,147 mln) was distributed based on income from hired employment for different household groups in our SAM.

Finally, trade and transport margins was disaggregated for each commodity proportionally according to values of import, export and domestic use.

[15] Geostat, 2013

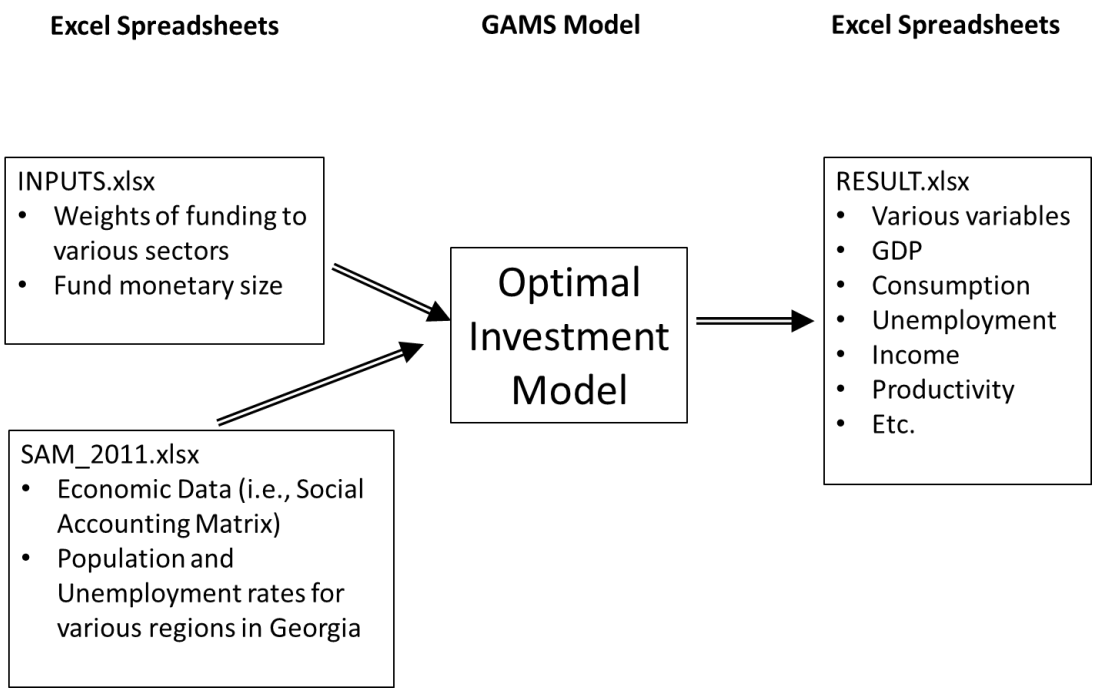
6 A tool for the Government of Georgia

This model is now owned and housed within the Ministry of Economics and Sustainable Development (MoESD) in Georgia. Ministry officials were trained to run the model and assess various scenarios, and can refer to an accompanied *Instruction Manual* document (Yerushalmi, 2015).

In this paper, the focus was on the aggregate level, and the size of the Development Fund was GEL 1 bln. However, MoESD officials can now easily change the focus of their research, for example, they can focus on one specific households (out of the twenty), and various investment scenarios. They can furthermore change the size of the fund as they wish.

To run and analyse this model, a simple three stage process is required (illustrated in Figure 6): (1) Update excel **input** files, which include monetary value of the fund (currently GEL 1 bln), various fund allocation weights, the Social Accounting Matrix (SAM) for 2013, regional unemployment levels for 2013, and population, (2) **Run** the GAMS model, and finally (3) Analyze an excel **output** file that is generated by the program.

Figure 6: Process of Operating the Model



7 Results: Where should a development fund invest?

As previously mentioned, we assume that GEL 1 bln is donated to Georgia (around 3.7% of GDP), and that these funds are channeled to the various sectors in the economy through a *Development Fund*. Since these funds are not collected through taxes, but rather donated from abroad, they have no tax distortion effects.

The Development Fund then channels the money into nine (out of 15) possible sectors in the form of an output subsidy. This is done using discreet jumps of 10%, until all money is cleared. This means, for example, that one possibility is for the fund to place 100% of the money in sector one, or a second option would be to support sector 1 with 90% of the fund and sector 2 with 10%.

The model then runs all possible combination of allocating the funds among the nine sectors. This comes out as 42,750 different combinations of investments, which are collected and analyzed in a database of results. Our aim is to find the "best" investment strategy that focuses on four social-economic goals:

1. GDP growth at a national level,
2. Welfare improvements, i.e., consumption growth, (at a national and regional levels)
3. Employment creation (at a national and regional levels)
4. Export promotion

These four targets were chosen in collaboration with officials from the Ministry of Economy and Sustainable Development in the Government of Georgia.

Below we report the results for various fund allocation options. First, we will look at the results when 100% of the fund is channeled into a single sector. Second, we analyze the *implied* weights from the Brussels Pledge Commitment (BPC) and the Georgian Co-Investment Fund (GCF) and how the model expects this to affect the economy. These two issues are reported in Table 5. Finally, we report on the best allocation from the 42,750 options of allocation, for each of social-economic goals. We will show that it is not possible to maximize all the social-economic goals at once, and that policy makers need to decide what specific issue to tackle.

7.1 Investing in a single sector

In the first nine scenarios in Table 5 (below), we report on the results in which only one sector receives all of the available funds; this is a type of sensitivity analysis. Note furthermore that being a static model, these results represent a change relative to the baseline. We can interpret them as additional benefits (or costs) that could occur in the next decade; roughly around 10 years after the fund allocated the money.

The results in Table 5 are not surprising. In all scenarios (sc1 to sc9), the main economic indicators are all improved (such as GDP, consumption, employment creation and exports). This is an expected result because Georgia received new resources that were not present pre-fund.

Table 5 reports that GDP improves most significantly if all the funding were to be allocated to the Wholesale and Retail Trade sector (sc5), and then to the manufacturing sector (sc2). These same scenarios coincide with the highest aggregate consumption. However, depending on the specific focus of consumption, if we target urban consumption, then investing in Financial Intermediation (sc 8) would be better, while rural consumption benefits most from supporting the Agriculture sector (sc1).

On the other hand, lowest aggregate unemployment levels could be achieved by investing in the financial sector (sc8). Unemployment is highest among hired laborer, which means that sectors that demand hired labors (relative more than others) should be supported to tackle this issue. As reported in Table 4, the financial sector is second to highest labor intensive (after Agriculture), and is 97% hired labor (with Agriculture only 7% hired). Therefore, the financial sector directly adds more jobs and reduces unemployment. Furthermore, the financial sector acts as an important intermediate input into other sectors. There are, therefore, positive spill-over onto other sectors, and this raises demand for employment overall.

Table 5 furthermore reports changes in the relative Urban-Rural and East-to-West consumption per capita, compared to the baseline, *i.e.*, a measure showing inequality. In the baseline, Urban-Rural consumption per capita was 2, while East-West consumption per capita was 1.27. By investing 100% of the fund in Agriculture, Urban-Rural relative consumption per capita falls by 0.5%. East-West consumption per capita falls when investing in Agriculture, Manufacturing, and Wholesale and Retail Trade. Other allocation strategies raise inequality, similar to findings in studies that were reviewed earlier.

Table 5: Results for BPC, GCF and 'All in ONE Sector' (% change compared to the pre-fund & unemployment rate)

			Only										
	GEL million		Agri.	Manuf.	Elec. Gas, Water	Construc.	Wholesale & Retail Trade	Hotels & Restaur.	Transp. & Comm.	Financial Intermed.	Real Estate and Business	Brussels Pledge	Georgian Fund
	level	base	sc1	sc2	sc3	sc4	sc5	sc6	sc7	sc8	sc9	sc10	sc11
							Percent change from baseline						
GDP	26,847	0.0	7.1	8.9	8.4	8.8	9.0	6.0	8.2	8.4	7.4	**9.1**	**9.5**
Cons	19,193	0.0	7.9	9.9	9.5	8.9	9.9	7.0	9.4	9.5	8.3	10.2	10.6
Cons Urb	12,506	0.0	7.8	10.9	11.2	10.2	11.0	8.5	10.6	12.0	9.8	11.6	12.4
Cons Rur	6,687	0.0	8.2	8.0	6.2	6.4	8.0	4.2	7.0	4.9	5.5	7.7	7.3
Aggregate exports	11,998	0.0	8.0	10.1	10.1	11.3	14.0	**17.8**	**15.5**	9.7	8.3	11.6	11.9
Rel Urb-Rur C-P		0.0	-0.5	2.6	4.6	3.6	2.8	4.0	3.4	6.7	4.1	3.8	4.6
Rel East-West C-P		0.0	-1.0	-0.3	1.4	0.0	-0.3	1.1	0.6	1.8	1.2	0.4	1.0
							Unemployment rate						
Unemp Rate		15.3%	10.2%	9.2%	8.9%	9.2%	9.9%	11.2%	8.8%	**8.3%**	10.0%	9.8%	**8.5%**
Unemp Rate Urban		26.1%	16.8%	14.6%	13.9%	14.5%	14.6%	18.5%	13.8%	12.3%	16.5%	13.8%	12.9%
Unemp Rate rur		7.4%	5.3%	5.3%	5.3%	5.3%	6.5%	5.8%	5.2%	5.3%	5.2%	6.8%	5.2%
Fund Size - mn GEL 2013			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
							Share of fund allocation						
wgt1 - Agriculture			100%									16%	4%
wgt4 - Manufacturing				100%								16%	23%
wgt5 - Electricity gas and water					100%							20%	46%
wgt6 - Construction						100%						5%	4%
wgt7 - Wholesale and retail trade							100%					8%	2%
wgt8 - Hotels and Restaurants								100%				4%	15%
wgt9 - Transport and Communication									100%			28%	4%
wgt10 - Financial Intermediation										100%		4%	2%
wgt11 - Real Estate and Business Activity											100%		

Source: Authors calculations. Note that baseline values are in GEL Million 2013. Main results (except for unemployment) are percent change compared to pre-FUND values. Values for unemployment are in unemployment levels.

7.2 Allocating as in the BPC and GCF

Additional benefits arise when sectors have synergies between them and within the value chain of production. We therefore ask whether by investing a proportion of the fund in multiple sectors, rather than all in a single sector, we can find a more rewarding allocation strategy. Section 2.2 described the Brussels Pledge Commitment (BPC) and the Georgian Co-Investment Fund (GCF) as two examples of funds that allocate funds according to a desired strategy. (See Table 1 and Table 2 for the way they channel the money.)

The weights in the BPC and GCF, however to do not coincide with the 9 production sectors that follow the national account system, as we do here. Therefore, in what follows, we make some simple assumptions in order to fit them to our methodology.

Table 1 reported the allocation of funds by the Brussels Pledge Commitment (BPC). First, we exclude the funds channeled to direct budget support (21%), and funds to Internally Displaced People (6%) because they target the government and households rather than production sectors – as we do in this model. Second, we make some *heroic* assumptions[16] and channel 50% of what is termed *private sector support* into the manufacturing sector, 25% into wholesale and retail trade, 12.5% into hotels and restaurants and 12.5% into the financial intermediation sector. Finally, 20% of what was termed *urban and municipal infrastructure* is channeled to the construction sector, and the remaining flow to other public sectors, which we do not analyze in this paper. The *implied* weights, based on these assumptions, are summarized in Table 6.

Some *heroic* assumptions are also made with the Georgian Co-Investment Fund (GCF). (Recall that Table 2 summarized the GCF investment plan). We assume that 50% of Agriculture and logistic funds flows into Agriculture and the other half into Transportation and communications. Furthermore, we split GCF's definition of *Others* into 50% construction, 25% Financial Intermediation and 25% Wholesale and Retail Trade. The *implied* weights, based on our assumptions, are summarized in Table 6.

Comparing these implied weights, we can see that the GCF is oriented towards private sector investments. These are mainly in the urban areas that are expected to provide higher returns, *e.g.*, energy, manufacturing, and hotel and restaurants. The BPC, on the other hand, focuses more on the sectors that are believed to support lower income households, mainly in rural areas, such as Agriculture, manufacturing, energy, and especially transportation that helps connect rural households to urban markets.

[16] In *heroic* we mean that these simple assumptions are based on our own judgments and are not based on official government documentation, nor information from the GCF, which are not available.

Table 6: Implied weight for allocating funds (% of total development fund)

Sector	ID	Brussels Pledge Commitment (BPC)	Georgian Co-Investment Fund (GCF)
Agriculture	Act1	16.4%	3.9%
Fishing	Act2		
Mining	Act3		
Manufacturing	Act4	15.6%	23.1%
Electricity, gas, water	Act5	19.7%	46.2%
Construction	Act6	4.9%	3.8%
Wholesale and retail trade	Act7	7.8%	1.9%
Hotels and restaurants	Act8	3.9%	15.4%
Transport and communication	Act9	27.9%	3.8%
Financial intermediation	Act10	3.9%	1.9%
Real estate	Act11		
Public administration	Act12		
Education	Act13		
Health and social work	Act14		
Other	Act15		
Total		**100%**	**100%**

Note: The table presents the implied weights based of the planned allocation of the Brussels Planned Commitment (BPC) and Georgian Co-Investment Fund (GCF) planned allocation with some assumptions in order to test these on our model.

The results are summarized in Table 5. In both cases, after allocating the funds across a range of sectors, the aggregate indicators are improved. GDP rises to 9.1% and 9.5% for the BPC and GCF, respectively. Consumption, which is our closest measure for welfare rises also, at the aggregate level and urban consumption. Note however that rural consumption does not rise as much as in scenario 1 or scenario 2, where the fund invest all assets into the Agriculture or Manufacturing sectors, respectively. This is mainly because supporting the Agriculture sector provides most income for rural households, and also because manufacturing sectors provide most employment and are key sectors in the value chain process.

Furthermore, unemployment in the Georgian Co-Investment Fund improves more than it would in the Brussels Pledge Commitment. This is mainly because unemployment rate in rural areas is lower than urban areas (6.9% versus 26.1%, respectively), it is more beneficial to invest in sectors that generate employment in urban areas, as the GCF does.

7.3 Can we do even better?

We now search among different combinations of shares of GEL 1 bln that are allocated to the various sectors. We use discreet jumps of 10% of the total fund size, and the simulation re-computes and saves the results. Table 7 provides an example of how this is done using discreet jumps of 20%. In what follows, we will show that we can find a better allocation. We furthermore show that the best allocation depends on the social-economic objective.

Table 7: A section of the model results using lumps of 20%

	Variables				Share of Fund into:										
LOOP ID	GDP	C	Unemp Rate	others	Agri. act1	Manuf. act4	Gas, Water act5	Construc. act6	Trade act7	Hotels & Restuarants act8	Transp. & Commun. act9	Finance act10	Estate& Busines act11	Total Share	Total Fund (GEL m)
. . .									. . .						
589	8.60	9.98	10.8%			0.2	0.2						0.6	1	1000
590	9.05	10.51	9.1%			0.2	0.2					0.2	0.4	1	1000
591	9.08	10.58	8.5%			0.2	0.2					0.4	0.2	1	1000
592	8.84	10.32	8.3%			0.2	0.2					0.6		1	1000
593	8.95	10.44	10.4%	. . .		0.2	0.2				0.2		0.4	1	1000
594	9.27	10.85	9.9%			0.2	0.2				0.2	0.2	0.2	1	1000
595	9.22	10.83	9.9%			0.2	0.2				0.2	0.4		1	1000
596	8.94	10.49	10.4%			0.2	0.2				0.4		0.2	1	1000
597	9.19	10.79	8.5%			0.2	0.2				0.4	0.2		1	1000
598	8.70	10.27	10.3%			0.2	0.2				0.6			1	1000
599	8.60	10.02	10.9%			0.2	0.2			0.2			0.4	1	1000
600	8.95	10.42	9.0%			0.2	0.2			0.2		0.2	0.2	1	1000
601	8.89	10.38	8.7%			0.2	0.2			0.2		0.4		1	1000
602	8.85	10.35	10.6%	. . .		0.2	0.2			0.2	0.2		0.2	1	1000
603	9.08	10.66	10.3%			0.2	0.2			0.2	0.2	0.2		1	1000
604	8.75	10.30	10.2%			0.2	0.2			0.2	0.4			1	1000
605	8.04	9.39	11.5%			0.2	0.2			0.4			0.2	1	1000
606	8.28	9.70	10.8%			0.2	0.2			0.4		0.2		1	1000
607	8.21	9.65	11.4%			0.2	0.2			0.4	0.2			1	1000
608	7.14	8.38	11.7%			0.2	0.2			0.6				1	1000
609	9.17	10.58	9.7%			0.2	0.2		0.2				0.4	1	1000
610	9.46	10.94	9.0%			0.2	0.2		0.2			0.2	0.2	1	1000
. . .									. . .						

7.3.1 Highest GDP and Consumption

We first search for the highest GDP and consumption allocation strategy, which are summarized in Table 8. We find that GDP can indeed be improved if funds would be allocated according to scenario 12. Note that at the top allocation strategies, the variation in results between one allocation and the other becomes very small. Therefore, scenario 13 reports on the average allocation of the top 20 highest GDP target. In both cases (*i.e.*, sc12 and sc13), what we learn is that a combination of manufacturing, electricity gas and water, transport and communications, and financial intermediation, leads to higher GDP.

An interesting result is the rise in interest rate (at around 8% above the baseline). In comparison, wages do not rise significantly. The explanation for this is linked to Table 4 that summarizes the input intensities in production in Georgia. In sc12 and sc13, investment focuses on the capital intensive sectors: (activity 4) Manufacturing, (activity 5) Electricity, Gas and Water, and (activity 9) Transport and communication. For example, Table 4 shows that capital inputs in manufacturing accounts for 77% of total input costs of production. Therefore, such a scenario boosts demand for capital, which is in fixed supply (Yerushalmi and Gorgodze, 2015). The result is a rise in the cost of capital, *i.e.*, a rise in the interest rate. Policy makers should be aware of this, and support policies that help raise the supply of capital, such as motivating more households to save, develop the equity market, and attract foreign capital (FDI). In addition, the high unemployment levels dampen wage increases because of competition in the labor market to obtain new jobs.

Furthermore, this highest GDP scenario also coincides with the highest *aggregate* consumption expenditure, which is commonly used as an indicator for welfare.[17] Table 8 shows that the aggregate consumption rises by 11%, relative to the baseline of *no* investment.

If, instead, the emphasis of the investment policy focuses on *urban* consumption, then scenarios 14 and 15 would be the best allocations, *i.e.*, more emphasis on financial intermediation, transportation and communications, and less manufacturing, and electricity gas and water, compared to sc12 and sc13. On the other hand, focusing on improving *rural* welfare would suggest that allocation of type sc16 (or sc17) is required, which puts more emphasis on promoting the Agriculture sectors, Manufacturing, and Transport and communication.

There are a few additional interesting points regarding scenario 16 and 17 that show that *"You can't always get what you want!"* On the positive side, Table 8 shows that *self-employed* wages rise significantly to 8.6% (relative to a baseline with no investment). This leads to a rise in rural household incomes, and a fall in agriculture and manufacturing output prices (not shown in this table) which are goods that are demanded more heavily by rural households (compared to other goods). The result is an improvement in rural welfare. However, on the negative side, urban consumption (welfare) does not rise as significantly as before, and wages for *hired* employees, which account for most urban employment, slightly drops in real terms by -0.5%. In addition, urban unemployment falls by less as it previously did (i.e., less urban jobs are created). For example in Table 8, comparing urban unemployment in sc14 with sc16, it falls to 11.7% when targeting urban welfare (sc14), but only to 15.5% when targeting rural

[17] There are other indicators of welfare, which are not based on economic indicators, such as work life balance, happiness, etc. These are not considered in this type of model.

welfare (sc16). Funds are diverted towards the Agriculture sectors, which require 93% self-employed laborers of total labor inputs (as reported in Table 4). Since unemployment is lower among rural households, promoting production sectors in these areas will help create *less* jobs.

Table 8: Searching for best allocations: GDP and consumption

			BPC	GCF	GDP		Urban Cons.		Rural Cons.	
	GEL mln					avrg top 20		avrg top 20		avrg top 20
	level	base	sc10	sc11	sc12	sc13	sc14	sc15	sc16	sc17
					Percent change from baseline					
GDP	26,847	0.0	9.1	9.5	**9.8**	**9.8**	9.7	9.7	8.3	8.2
Cons	19,193	0.0	10.2	10.6	11.0	11.0	10.9	11.0	9.2	9.1
Cons Urb	12,506	0.0	11.6	12.4	13.0	13.0	**13.1**	**13.2**	9.7	9.6
Cons Rur	6,687	0.0	7.7	7.3	7.1	7.2	6.8	6.9	**8.4**	**8.3**
Aggregate exp	11,998	0.0	11.6	11.9	10.6	11.2	11.1	11.2	9.3	9.5
Interest Rate		0.0	6.8	7.9	8.0	8.2	8.0	8.1	4.7	4.5
Wage Self		0.0	4.2	0.7	0.8	0.9	0.8	0.9	8.6	9.1
Wage Hire		0.0	0.0	0.3	0.7	0.7	0.8	0.9	-0.5	-0.5
Rel Urb-Rur C-P		0	3.8	4.6	5.5	5.4	5.8	5.8	1.1	1.1
Rel East-West C-P		0	0.4	1.0	1.2	1.1	1.4	1.5	-0.6	-0.6
					Unemployment rate					
Unemp Rate		15.3%	9.8%	8.5%	8.0%	8.1%	7.9%	7.9%	9.7%	9.8%
Unemp Rate Urban		26.1%	13.8%	12.9%	11.9%	12.0%	11.7%	11.7%	15.5%	15.5%
Unemp Rate rur		7.4%	6.8%	5.2%	5.1%	5.1%	5.1%	5.1%	5.4%	5.5%
Fund Size - mln GEL 2013			1000	1000	1000	1000	1000	1000	1000	1000
					Share of fund allocation					
wgt1 - Agriculture			16%	4%				1%	50%	53%
wgt4 - Manufacturing			16%	23%	20%	13%	10%	4%	40%	29%
wgt5 - Electricity gas and water			20%	46%	30%	34%	20%	28%		2%
wgt6 - Construction			5%	4%						
wgt7 - Wholesale and retail trade			8%	2%		9%		7%		7%
wgt8 - Hotels and Restaurants			4%	15%		4%		2%		
wgt9 - Transport and Communica			28%	4%	10%	9%	20%	15%	10%	10%
wgt10 - Financial Intermediation			4%	2%	40%	33%	50%	45%		
wgt11 - Real Estate and Business Activity										

Source: Model Results; Note: the table shows the main results for various allocation strategies. Sc10 and sc11 present the results of the Brussels Pledge Commitment (PBC) and the Georgian Co-Investment Fund (GCF) and then shows that it is possible to improve the allocation to achieve certain goals, *e.g.*, maximize GDP (sc12), Urban Consumption (sc14), or Rural Consumption (sc16).

Box 1: A tool for policy analysis

This model is not only meant to only analyze a fund of size GEL 1 bln. Rather, this value was used as an example. Officials within the Ministry of Economy and Sustainable Development are trained to use this model to analyze other fund sizes and allocation strategies. They could also focus on investment strategies that are specific to a region in the economy.

What are the main mechanisms that drive our results?

As previously mentioned, our CGE model is calibrated to Georgia, based on the 2013 Social Accounting Matrix (SAM). Table 4 (from Section 5.1) summarized the input share intensities for production, between capital and labor, and between self-employed and hired labor (*i.e.*, part of the value chain process). In addition, Table 9 (below) summarizes the endowment share of households by region-urbanity. Table 10 summarizes the shares of intermediate goods in domestic production (*i.e.*, also a part of the value chain process), and Table 11 the share of household consumption expenditure by regions and urbanity. (In both Table 10 and Table 11, we deleted shares below 5% in order to focus on the important elements within the tables.)

The tables illustrate a complex network of demand-supply links between inputs, intermediate goods, and final goods. There are, furthermore, many additional variables that correspond to international trade, investment, and others (based on GeosStat). These are not shown here, but are available from the authors upon request.

The mechanisms are briefly explain below: First, Table 10 shows part of the value chain in production. Manufacturing sectors, for example, are clearly important intermediate-inputs in the value chain of many sectors. For example, supporting manufacturing sectors, which lowers its output price, indirectly promotes Agriculture that requires 37% of intermediate inputs from the manufacturing sector (see Table 10, column act1). Similar high shares are required by other sectors from the manufacturing sector.

Note how Table 10 (column act4) also shows that manufacturing (i.e., Agri-Business) also requires a high share of intermediate inputs from agriculture; Agriculture accounts for 22% of the total intermediate inputs into manufacturing. The main message is that there are strong synergies between these two sectors. Supporting rural households can be achieved in two ways: (i) directly supporting farmers, which boost supply of agricultural goods, and (ii) supporting agri-business (*i.e.*, manufacturing) which creates *new* demands for agriculture downstream in the value chain (*e.g.*, grapes produced by the Agriculture sector are later demanded as inputs in the wine Agri-businesses).

Scenario 16 (in Table 8), in which we search for the highest rural welfare, is a clear example of these synergies. Supporting rural welfare is done most effectively by directly promoting the agricultural sectors (50% of the fund is placed into Agriculture), and indirectly by supporting manufacturing sectors (40% of the fund is placed into Manufacturing). Scenario 17, is the average of the top 20 allocations for promoting rural welfare, and shows those additional important sectors in the value chain, such as Transport and Communication and Wholesale and Retail Trade.

Table 9: Share of input endowment by region and urbanity

	Urban				Rural			
	Self Employed	Hired	Capital	Total	Self Employed	Hired	Capital	Total
Kakheti	8%	53%	39%	100%	22%	2%	76%	100%
Tbilisi	6%	37%	57%	100%	67%	7%	26%	100%
Shida Kartli	7%	31%	62%	100%	27%	3%	70%	100%
Kvemo Kartl	8%	49%	43%	100%	36%	4%	60%	100%
Samtskhe-Javakheti	5%	32%	64%	100%	17%	2%	81%	100%
Adjara	13%	46%	41%	100%	39%	4%	58%	100%
Guria	4%	29%	66%	100%	29%	3%	68%	100%
Samegrelo and Zemo Svaneti	2%	15%	83%	100%	22%	2%	76%	100%
Imereti	6%	41%	53%	100%	44%	4%	52%	100%
Mtskheta-Mtianeti	6%	42%	51%	100%	41%	4%	55%	100%

Source: GeoStat. Note: The table shows that share of labor and capital endowment for each regional household and urbanity.

Second, Table 11 summarizes the expenditure patterns of the various regional-urbanity households across Georgia, while Table 9 shows their endowment share of labor and capital. Policy makers can also support households by promoting those sectors that are mostly related to households consumption patterns and sources of income, either by lowering cost of consumption, or by creating demand for further jobs. Thus, by making specific goods more abundant and cheaper, household real income rises. Furthermore (from Table 4 in Section 5.1), supporting various production sectors raises demand for labor and capital, which raises household incomes because they are endowed with various proportions and types of labor and capital inputs.

It is a complex matter to distinguish which strategy is most efficient for a given fund level, and this is especially difficult within a partial-equilibrium framework. Our general equilibrium model, is therefore a useful tool for policy analysis. Below we continue with a summary of the best allocations for the additional social goals not yet covered.

Table 10: Share of intermediate inputs in production (%, <5% deleted)

		Agri.	Fishing	Mining	Manuf.	Electricity, gas, water	Construction	Trade	Hotels and restaurants	Transp. & commun.	Financial interm.	Real estate	Public admin.	Education	Health and social work	Other
		act1	act2	act3	act4	act5	act6	act7	act8	act9	act10	act11	act12	act13	act14	act15
Agriculture	Com1	56%		12%	22%								12%	9%		
Fishing	Com2															
Mining	Com3				8%	23%										
Manufacturing	Com4	37%	68%	51%	52%	7%	63%	33%	44%	52%	18%	21%	59%	53%	57%	24%
Electricity, gas, water	Com5			7%	6%	15%		5%	8%			7%		7%	6%	7%
Construction	Com6						27%								6%	
Wholesale and retail trade	Com7							5%		6%						
Hotels and restaurants	Com8									8%						
Transport and communication	Com9			13%		11%		9%	13%	20%	6%	21%			12%	7%
Financial intermediation	Com10		12%			17%		7%	19%			16%				
Real estate	Com11			7%		8%		36%		6%	57%	23%		20%	8%	42%
Public administration	Com12															
Education	Com13											6%				
Health and social work	Com14												7%			
Other	Com15					14%							6%			
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 11: Share of commodity consumption by region and urbanity (%, <5% deleted)

	Kakheti		Tbilisi		Shida Kartli		Kvemo Kartl		Samtskhe-Javakheti		Adjara		Guria		Samegrelo and Zemo Svaneti		Imereti		Mtskheta-Mtianeti		Gov
	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rual	Urban	Rural	
1. Agriculture	14%	13%	8%	15%	8%	11%	9%	13%	10%	10%	8%	15%	16%	16%	10%	9%	9%	12%	7%	15%	
2. Fishing																					
3. Mining																					
4. Manufacturing	48%	57%	44%	13%	58%	65%	44%	59%	63%	60%	42%	39%	60%	57%	66%	66%	55%	57%	49%	40%	
5. Electricity, gas, water				6%																	
6. Construction																					
7. Wholesale and retail trade																					
8. Hotels and restaurants																					
9. Transport and communication		7%	7%	22%		7%	7%	6%		7%		8%		7%		6%	6%	8%	15%	10%	
10. Financial intermediation																					
11. Real estate	5%		8%	8%	6%	2%	8%				7%	7%					5%				
12. Public administration																					70%
13. Education																					18%
14. Health and social work	6%		9%	9%	6%		9%				8%	7%					6%		5%		11%
15. Other	6%	7%		8%		6%		7%			10%	6%	9%	6%		6%		7%		16%	
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

7.3.2 Creating jobs, fighting unemployment

In terms of the best allocation strategy for creating jobs (*i.e.*, fighting unemployment), policy makers are lucky because one policy actually fits most regional-urbanity dimensions.

Table 12 (below) shows that sc18 is the best allocation strategy to reduce unemployment, with sc19 the average of the top 20. Aggregate unemployment could drop from 15.3% to 7.7% in sc18. Other unemployment dimensions, such as Urban, Rural, East, West, will drop as well.

To reduce urban unemployment, a basic support package to the Agriculture sectors is necessary, but the largest proportion should go towards service oriented sectors, especially Financial Intermediation, that promote jobs for hired labors, because it is a highly labor intensive sector, and is an important intermediate input in other sector.

Table 12: Reducing unemployment

	level	base	Aggregate sc18	Aggregate (avrg top 20) sc19
			Unemployment rate	
Unemp Rate		15.3%	7.7%	7.8%
Unemp Rate Urban		26.1%	11.3%	11.4%
Unemp Rate rur		7.4%	5.1%	5.1%
Unemp Rate East		17.6%	8.8%	8.8%
Unemp Rate West		12.9%	6.6%	6.6%
Unemp Rate Tbilisi		29.1%	13.5%	13.6%
			Percent change from baseline	
GDP	26,847	0.0	9.4	9.4
Cons	19,193	0.0	10.6	10.6
Cons Urb	12,506	0.0	12.9	12.9
Cons Rur	6,687	0.0	6.2	6.2
Cons East	11,565	0.0	11.2	11.2
Cons West	7,628	0.0	9.6	9.6
C Tbilisi		0.0	12.5	12.4
C Imereti		0.0	7.3	7.3
C Samegrelo		0.0	8.0	8.1
C Guria		0.0	8.9	9.0
C Kakheti		0.0	7.3	7.3
Fund Size - mn GEL 2013			1000	1000
			Share of fund allocation	
wgt1 - Agriculture			10%	9%
wgt4 - Manufacturing				2%
wgt5 - Electricity gas and water			10%	7%
wgt6 - Construction				1%
wgt7 - Wholesale and retail trade				3%
wgt8 - Hotels and Restaurants				1%
wgt9 - Transport and Communication			10%	9%
wgt10 - Financial Intermediation			70%	69%
wgt11 - Real Estate and Business Activity				2%

7.3.3 Export promotion

Export promotion requires a focus on hotels and restaurants. Real exchange rate depreciates, making it more attractive for foreign consumers to buy domestic productions, including hotel and restaurants. This strategy, however, does not promote high GDP growth or consumption, nor does is do well in creating job opportunities compared to the previous scenarios that were discussed. For example, Table 13 shows that though aggregate exports rises by 17.8% (sc33), measures such as GDP and various consumption (at an aggregate level and regional level) do not rise as significantly as they did in alternative investment strategies (sc12). Export promotion also creates less job opportunities compared to alternative scenarios which are better (e.g., sc18).

The message is that focusing purely on export promotion is not a top strategy for Georgia. Rather, the country would benefit more by focusing on welfare improving investments.

Table 13: Export promoting allocations (% change from baseline, unemployment rate)

			Highest GDP	**Lowest Unemp**	**Highest Export**	**Highest Export avrg 20**
	level	base	sc12	sc18	sc38	sc39
			Percent change from baseline			
Aggregate exports	11,998	0.0	10.6	10.5	**17.8**	**17.2**
Real exchange rate		0.0	1.1	1.2	**-3.2**	**-2.5**
GDP	26,847	0.0	9.8	9.4	6.0	7.0
Cons	19,193	0.0	11.0	10.6	7.0	8.0
C Tbilisi	7,482	0.0	12.4	12.5	8.0	9.2
C Imereti	2935.7	-0.1	7.8	7.3	4.7	5.2
C Samegrelo	1739.7	0.0	9.1	8.0	5.7	6.8
C Guria	414.5	-0.2	10.0	8.9	6.2	7.4
C Kakheti	1,240.5	-0.1	8.1	7.3	4.9	5.5
			Unemployment rate			
Unemp Rate		15.3%	8.0%	7.7%	11.2%	10.2%
Fund Size - mn GEL 2013			1000	1000	1000	1000
			Share of fund allocation			
wgt1 - Agriculture				10%		2%
wgt4 - Manufacturing			20%			1%
wgt5 - Electricity gas and water			30%	10%		1%
wgt6 - Construction						2%
wgt7 - Wholesale and retail trade						6%
wgt8 - Hotels and Restaurants					100%	82%
wgt9 - Transport and Communication			10%	10%		8%
wgt10 - Financial Intermediation			40%	70%		1%
wgt11 - Real Estate and Business Activity						

7.4 How NOT to invest!

The model also indicates which strategies will deliver the **worst** results for specific social-economic targets. Note however that in all of them, Georgia still benefits because receiving funding is always welfare improving. The issue, therefore, is how to allocate the funds more effectively.

For example, investing too heavily in Hotels and Restaurants (as summarized in sc40 of Table 14, in which 100% of the fund is invested in this sector) will slow GDP growth to 6% and Consumption growth to 7%. This is compared to sc12 where GDP rises by 9.8% and consumption by 11%. The reason for this is the limited positive spillovers onto the production value chain of other sectors (see Table 10, row com8). Recall, however, that this scenario is actually the best for export promotion, which is therefore another example of a situation where "You can't always get what you want!"

Creating the *least* amount of jobs would occur if the country invests too heavily in Construction or Hotels and Restaurants (see sc41). Compare this with the best allocation for creating jobs that was summarized in sc18 and sc19 of Table 12.

Finally, investing 100% in Agriculture (see sc42) will deliver the *least* export promotion. It does, however, raise the wages of the self-employed by 14.6%, which therefore raises rural income and welfare. It is furthermore interesting to note that this scenario actually supports consumption growth in Guria (raising average consumption in Guria by 10.4%) because of their links to the Agriculture sector.

Table 14: How NOT to invest (% change from baseline, unemployment rate)

			Best	Worst		
			GDP	GDP	Unemp	Export
	level	base	sc12	sc40	sc41	sc42
			Percent change from baseline			
GDP	26,847	0	9.8	6.0	7.6	7.1
Cons	19,193	0	11.0	7.0	8.3	7.9
Cons Urb	12,506	0	13.0	8.4	10.4	7.8
Cons Rur	6,687	0	7.1	4.2	4.3	8.2
Cons East	11,565	0	11.5	7.4	8.8	7.5
Cons West	7,628	0	10.2	6.2	7.5	8.6
C Tbilisi		0	12.4	8.0	10.2	6.8
C Imereti		0	7.8	4.7	4.0	6.5
C Samegrelo		0	9.1	5.7	7.0	7.0
C Guria		0	10.0	6.2	7.2	10.4
C Kakheti		0	8.1	4.9	5.1	6.9
Aggregate exports	11,998	0	10.6	17.8	15.3	8.0
Real exchange rate		0	1.1	-3.2	-1.5	-0.2
Interest Rate		0	8.0	6.0	5.3	2.2
Wage Self		0	0.8	0.9	-0.3	14.6
Wage Hired		0	0.7	0.9	-0.3	-0.5
			Percent change from baseline			
Unemp Rate		15.3%	8.0%	11.2%	12.3%	10.2%
Unemp Rate Urban		26.1%	11.9%	18.5%	15.2%	16.8%
Unemp Rate rur		7.4%	5.1%	5.8%	10.2%	5.3%
Unemp Rate East		17.6%	9.2%	12.7%	13.2%	12.1%
Unemp Rate West		12.9%	6.8%	9.6%	11.4%	8.1%
Unemp Rate Tbilisi		29.1%	14.2%	20.7%	16.3%	20.1%
Fund Size - mn GEL 2013			1000	1000	1000	1000
			Share of fund allocation			
wgt1 - Agriculture						100%
wgt4 - Manufacturing			20%			
wgt5 - Electricity gas and water			30%			
wgt6 - Construction					40%	
wgt7 - Wholesale and retail trade						
wgt8 - Hotels and Restaurants				100%	60%	
wgt9 - Transport and Communication			10%			
wgt10 - Financial Intermediation			40%			

8 Conclusion

Given limited funds, policy makers search for the best allocation strategies that could achieve the highest social welfare. In our discussions with the Ministry of Economy and Sustainable Development in Georgia, we learned that they are interested in the following social-economic indicators: GDP, welfare, employment creation, and export promotion. Loosely speaking, they want the most "value for money!"

To assist the government, we developed an economy-wide small open economy general equilibrium model. It includes 15 production sectors and 20 households, which are characterized by their region and urbanity, and also a government and international trade. Based on GeoStat data, the model is calibrate to a new dataset for Georgia that we developed *in-house*.

In the past decade, foreign capital inflows in the form of donations amounted to around 4% of GDP per year, on average. These donations were funneled into the economy through development aid funds that allocated the money based on a set of beliefs and objectives (some social and some economic). For example, to develop infrastructure, support agriculture and rural households, and others.

To consider these issues, we include a new feature into a CGE model, i.e., a *development fund*. This fund is assumed to receive donations from abroad, and therefore has no distortionary tax effects. Once the funds are received, the government – through the development fund - allocates the money to various sectors as an output subsidy, until all the money is cleared from the fund.

The purpose of the model is to assist policy makers in searching for the most efficient allocation strategy given a fund size and given a specific social-economic target (*i.e.*, GDP, welfare, employment, and export). The model simulated a vast number of possible allocations strategies to search for the best allocation within a single unified model.

We find that that investing in the economy promotes economic growth, but that it is impossible to promote all metrics of success at once. The focus of the investment depends on the social aim of the program. In other words, policy makers should choose where to invest in order to promote a specific agenda, without promising to support all other agendas at the same time.

Table 15 (below) complies the best allocations that achieve the various targets: sc12 maximizes GDP, sc16 maximizes rural consumption, sc18 reduces unemployment and sc38 promotes exports.

Table 15: Best Social-Economic Target (% change from baseline, unemployment level)

			GDP	Rural Consumption	unemp	export
	level	base	sc12	sc16	sc18	sc38
			Percent change from baseline			
GDP	26,847	0.0	9.8	8.3	9.4	6.0
Cons	19,193	0.0	11.0	9.2	10.6	7.0
Cons Urb	12,506	0.0	13.0	9.7	12.9	8.4
Cons Rur	6,687	0.0	7.1	8.4	6.2	4.2
Cons East	11,565	0.0	11.5	9.0	11.2	7.4
Cons West	7,628	0.0	10.2	9.6	9.6	6.2
C Tbilisi		0.0	12.4	8.6	12.5	8.0
C Imereti		-0.1	7.8	7.2	7.3	4.7
C Samegrelo		0.0	9.1	8.8	8.0	5.7
C Guria		-0.2	10.0	11.2	8.9	6.2
C Kakheti		-0.1	8.1	7.8	7.3	4.9
Aggregate exports	11,998	0.0	10.6	9.3	10.5	17.8
Real exchange rate		0.0	1.1	-0.5	1.2	-3.2
PK		0.0	8.0	4.7	7.1	6.0
PL_self		0.0	0.8	8.6	1.1	0.9
PL_hire		0.0	0.7	-0.5	0.9	0.9
CPI Georgia		0.0	0.3	-0.4	0.5	0.5
			Unemployment rate			
Unemp Rate		15.3%	8.0%	9.7%	7.7%	11.2%
Unemp Rate Urban		26.1%	11.9%	15.5%	11.3%	18.5%
Unemp Rate rur		7.4%	5.1%	5.4%	5.1%	5.8%
Unemp Rate East		17.6%	9.2%	11.3%	8.8%	12.7%
Unemp Rate West		12.9%	6.8%	7.9%	6.6%	9.6%
Unemp Rate Tbilisi		29.1%	14.2%	18.5%	13.5%	20.7%
Fund Size - mn GEL 2013			1000	1000	1000	1000
			Share of fund allocation			
wgt1 - Agriculture				50%	10%	
wgt4 - Manufacturing			20%	40%		
wgt5 - Electricity gas and water			30%		10%	
wgt6 - Construction						
wgt7 - Wholesale and retail trade						
wgt8 - Hotels and Restaurants						100%
wgt9 - Transport and Communication			10%	10%	10%	
wgt10 - Financial Intermediation			40%		70%	
wgt11 - Real Estate and Business Activity						

This model is now housed within the Ministry of Economics and Sustainable Development in Georgia. We had trained local ministry officials to run the model and assess various scenarios on their own.

In this paper, we focused on a development fund of GEL 1 bln. But this value could easily be changed to assess other levels of funding support. We furthermore focused on a macro-level perspective and reported on the best allocations for a limited range of aggregate measures. However, the focus could have just as easily been made on assessing other metrics, for example, supporting a specific regional-urbanity household (out of the twenty different households), supporting price stability, etc.

Further extensions in this model could be the following: first, if wished by the government, we could re-designed the model to assess a *development fund* that is based on tax collection, rather than a foreign donation. In this case, the model setup does not change drastically, but more focus would be required to consider the distortions created by the tax policy. Second, the model assumes that the funding is a subsidy tax on output. Alternatively, the funding could take the form of a labor subsidy or capital subsidy, and the model could then search for a preferred subsidy policy design.

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